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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/539,015	06/16/2005	Michael Francis McDonald	2003B133F	7409
23455	7590	06/08/2006		
EXXONMOBIL CHEMICAL COMPANY				
5200 BAYWAY DRIVE				
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			EXAMINER	
			TESKIN, FRED M	
			ART UNIT	PAPER NUMBER
			1713	

DATE MAILED: 06/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/539,015

Applicant(s)

MCDONALD ET AL.

Examiner

Fred M. Teskin

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-57 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16, 18-29, 35, 43-47 and 52-57 is/are rejected.
- 7) ☒ Claim(s) 17, 30-34, 36-42 and 48-51 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |  |
|---|--|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>061605</u> . | 6) <input type="checkbox"/> Other: ____  |

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The preliminary amendment of June 16, 2005 having been entered, claims 1-57 are currently pending and under examination.

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5, 16, 18-29, 35, 43-47 and 52-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over RU 2209213, in view of US 2548415 to Welch et al.

The invention, as defined in claim 1, is a process to produce polymers comprising contacting one or more monomer(s), a catalyst system, and a diluent comprising one or more hydrofluorocarbon(s) (HFC's) in a reactor comprising a bayonette.

As acknowledged herein with reference to, e.g., RU '213, bayonette cooled slurry reactor systems have been described (Specification, parag. 161). In particular, RU '213 is seen to disclose a butyl rubber production process wherein isobutylene/isoprene

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copolymerization is conducted in a polymerizer in the presence of Friedel-Crafts catalyst in methyl chloride medium to form solid polymer suspended in methyl chloride followed by degassing of the reaction mixture. As depicted in Figures 1 and 2 (pages 1 and 6), the polymerizer 2 is a continuous-type reactor having a vertical cylindrical housing and comprising a shaft 6 to which mixing blades are attached and a peripherally disposed tubular heat exchanger element 21.

RU '213 differs from the claimed invention essentially in the use of a methyl chloride medium instead of a diluent comprising one or more HFC's, as claimed.

However, the benefits of preparing isoolefin/diolefin copolymer in a fluoro-substituted hydrocarbon diluent, rather than methyl chloride, are recognized in the prior art as taught by Welch et al. See in particular Example I and Run Nos. 1-5 in Tables I and Ia: the use of ethylidene fluoride as feed diluent and/or  $\text{BF}_3$  catalyst solvent is shown to provide isobutylene/isoprene copolymers of superior physical properties (e.g., tensile and ultimate elongation) than the corresponding copolymer made in methyl chloride medium. In addition, the effect of using a fluoro-substituted hydrocarbon diluent is said to be "a very great reduction in reactor fouling rate ..." (col. 9, lines 60+) as detailed in Example 3 and Tables III and IIIa, for ethylidene fluoride diluent in a continuous-type reactor; similar runs are reported in Examples 4-9 using other specific fluoro-substituted hydrocarbon diluents. Furthermore, while the  $\text{BF}_3$  complex is said to be preferred, Welch et al also identify certain complexes of  $\text{AlCl}_3$  as "good catalysts when dissolved in  $\text{CH}_3\text{CHF}_2$ " (i.e., ethylidene fluoride) (col. 5, ll. 30-35). Both  $\text{BF}_3$  and  $\text{AlCl}_3$  complexes are species of catalyst within claims 35 and 43-45. (Claim 45 being

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construed as excluding only Lewis acids "represented by the formula  $MX_3$ ", which formula does not literally embrace *complex* compounds as taught by Welch et al.)

Given the specific, substantial benefits taught by Welch et al in connection with the use of a fluoro-substituted hydrocarbon diluent and  $BF_3$  catalyst in preparing isobutylene/isoprene copolymer, especially in a continuous-type reactor, one would have been well motivated to use such diluent and Friedel-Crafts catalyst in the butyl rubber production process of RU '213 and reasonably expect to achieve comparable benefits, e.g., comparable reduction in reactor rate fouling rate. Accordingly, at the time of applicants' invention, it would have been obvious to one of ordinary skill in the art, from the teachings of Welch et al, to carry out the process of RU '213 utilizing a Friedel-Crafts catalyst such as a  $BF_3$  or  $AlCl_3$  complex and a fluoro-substituted hydrocarbon diluent like ethylidene fluoride in lieu of methyl chloride, and thereby arrive at the present invention.

In making the above rejection, it has been determined that the effective filing date of the present application is no earlier than December 19, 2003, the applicants' international filing date, since none of the earlier-filed provisional applications to which priority is claimed is found to support, in the manner required by 35 USC 112, first paragraph, the entire subject matter of the invention as claimed herein. In particular, the concept of using a "reactor comprising a bayonette" as broadly claimed (claim 1) is not found to be described, expressly or implicitly, in any of the referenced provisional applications. Since the international filing date is subsequent to the July 27, 2003 publication date of RU '213, the document qualifies as prior art under 35 U.S.C. 102(a).

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Claims 6-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over RU '213, in view of Welch et al as applied to claims 1-5, 16, 18-29, 35, 43-47 and 52-57 above, and further in view of RU 2097122.

RU '213 discloses a bayonette cooled slurry reactor system and provides for introducing catalytic solution into any stream returned into the copolymerization stage or into polymerizer (see, Abstract), but does not appear to describe the features of the heat exchanger tubes and catalyst system delivery tube as per claims 6-15.

Nevertheless, the claimed reactor features are known in the rubber art as taught by RU '122. In particular, RU '122 describes a polymerizer provided with a coaxially disposed shaft with stacked blade stirrers and heat exchanger tube bundles peripherally disposed, the bundles being separated into sectors and having tube boards and tube divisions. See, Abstract and Figures 1-3, which also show the claimed feature of a catalyst system delivery pipe angled downward toward a mixer (stirrer 4), its open end being located in the annular space between tube bundles 6 and stirrer 4.

As the purpose of the RU '122 polymerizer is the same as that of RU '213, namely, application to butyl rubber manufacture, one of ordinary skill would have been led to combine their respective teachings. Thus, it would have been obvious to one having ordinary skill in the art to modify the primary reference process so as to provide the polymerizer thereof with heat-exchange tube bundles and an angled catalyst introduction pipe, as claimed, to obtain the improved design effect taught by RU '122.

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Claims 17, 30-34, 36-42 and 48-51 are objected to as being dependent on a rejected base claim but would be allowable if rewritten in independent form including all the limitations of the base claim and any intervening claim. The features of these dependent claims, particularly regarding species of comonomer, Lewis acid and initiator, and inclusion of defined quantity of water, are not taught nor fairly suggested in the available prior art.

Any inquiry concerning this communication should be directed to Examiner F. M. Teskin whose telephone number is (571) 272-1116. The examiner can normally be reached on Monday through Thursday from 7:00 AM - 4:30 PM, and can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reached on (571) 272-1114. The appropriate fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

FMTeskin/06-06-06

  
**FRED TESKIN**  
**PRIMARY EXAMINER**  
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